

LIST OF CLAIMS / AMENDMENTS

In the Claims

Claim 19 was previously canceled.

Please cancel claims 27, 29-54, 64, 67, and 71-86 without prejudice.

Please amend claims 1-18, 20-26, 28, 55-63, 65-66, and 68-70 as shown herein.

Claims 1-18, 20-26, 28, 55-63, 65-66, and 68-70 are pending and are listed following:

1. (currently amended) A network system, comprising:

a first computer configured to maintain an object comprising a plurality of multi-valued attributes that each have associated values, at least one having a multi-valued attribute that includes of the object having a link table value that links to a link table which includes a plurality of individual linked values, the individual linked values having associated therewith respective conflict-resolution data, and wherein where the first computer is adapted to update the conflict-resolution data associated with at least one linked value in the link table in response to at least a first modification made to the linked value;

at least a second computer configured to replicate the object to generate a replica object comprising the plurality of multi-valued attributes that each have the associated values, and comprising a replica of the link table which includes replicas of the individual linked values having to maintain a replica of the value as

1 ~~a link to a plurality of replica linked values associated with the replica object, the~~  
2 ~~replica linked values having~~ associated therewith respective further  
3 conflict-resolution data, ~~and wherein~~ where the second computer is adapted to  
4 update the further conflict-resolution data associated with a replica linked value in  
5 response to at least a further modification made to the replica linked value ~~on the~~  
6 ~~second computer~~; and

7 at least one of the first computer and the second computer being further  
8 configured to resolve a replication conflict between the linked value of the  
9 multi-valued attribute in the object and the replica linked value of the multi-valued  
10 attribute in the replica object, the replication conflict arising from the first  
11 modification modifications made to the linked value on the first computer and  
12 ~~from the further modification~~ made to the replica linked value on the second  
13 computer, and the replication conflict being resolved, at least in part, based upon  
14 the conflict-resolution data and the further conflict-resolution data.  
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18 2. (currently amended) A network system as recited in claim 1,  
19 wherein at least one of the first computer and the second computer is further  
20 configured to compare the conflict-resolution data associated with the linked value  
21 of the multi-valued attribute in the object and the further conflict-resolution data  
22 associated with the replica linked value of the multi-valued attribute in the replica  
23 object to resolve the replication conflict.  
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1           3.     (currently amended)     A network system as recited in claim 1,  
2     wherein the conflict-resolution data comprises a version indicator that corresponds  
3     to a version of ~~an individual~~ the linked value in the object.

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5           4.     (currently amended)     A network system as recited in claim 1,  
6     wherein the conflict-resolution data and the further conflict-resolution data each  
7     comprise at least a respective version number that corresponds to a version of ~~an~~  
8     ~~individual~~ the linked value and the replica linked value, and wherein at least one  
9     of the first computer and the second computer is further configured to:

10           compare the version number ~~associated with~~ that corresponds to the linked  
11     value of the multi-valued attribute in the object and the version number associated  
12     with that corresponds to the replica linked value of the multi-valued attribute in  
13     the replica object to resolve the replication conflict; and

14           update the replica linked value of the multi-valued attribute in the replica  
15     object if the replica linked value has a lower version number than the linked value  
16     of the multi-valued attribute in the object.  
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20           5.     (currently amended)     A network system as recited in claim 1,  
21     wherein the conflict-resolution data comprises an update indicator that  
22     corresponds to when ~~an individual~~ the linked value in the object is updated.  
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6. (currently amended) A network system as recited in claim 1,  
wherein the conflict-resolution data and the further conflict-resolution data each  
~~comprise at least respective update timestamps that correspond a respective update~~  
~~timestamp that corresponds~~ to when ~~an individual~~ the linked value and the replica  
linked value is are updated, and wherein at least one of the first computer and the  
second computer is further configured to:

compare the update timestamp associated ~~with~~ that corresponds to the  
linked value of the multi-valued attribute in the object and the update timestamp  
~~associated with~~ that corresponds to the linked value of the multi-valued attribute in  
the replica object to resolve the replication conflict; and

update the replica linked value of the multi-valued attribute in the replica  
object if the replica linked value has an earlier update timestamp than the linked  
value of the multi-valued attribute in the object.

7. (currently amended) A network system as recited in claim 1,  
wherein the conflict-resolution data comprises a creation indicator that  
~~corresponds to when an individual~~ the linked value in the object is created.

1           **8. (currently amended)**       A network system as recited in claim 1,  
2 wherein the conflict-resolution data and the further conflict-resolution data each  
3 ~~comprise at least respective a creation timestamps that correspond a respective~~  
4 creation timestamp that corresponds to when ~~an individual~~ the linked value and the  
5 replica linked value ~~is~~ are created, and wherein at least one of the first computer  
6 and the second computer is further configured to:

7           compare the creation timestamp ~~associated with that corresponds to~~ the  
8 linked value of the multi-valued attribute in the object and the creation timestamp  
9 ~~associated with that corresponds to the replica~~ linked value of the multi-valued  
10 attribute in the replica object to resolve the replication conflict; and

11           update the replica linked value of the multi-valued attribute in the replica  
12 object if the replica linked value has an earlier creation timestamp than the linked  
13 value of the multi-valued attribute in the object.

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15           **9. (currently amended)**       A network system as recited in claim 1,  
16 wherein the conflict-resolution data comprises a version indicator that corresponds  
17 to a version of ~~an individual~~ the linked value, and ~~comprises~~ an update indicator  
18 that corresponds to when the ~~individual~~ linked value is updated.

1           10. (currently amended)       A network system as recited in claim 1,  
2 wherein the conflict-resolution data and the further conflict-resolution data each  
3 comprise at least respective version numbers that correspond a respective version  
4 number that corresponds to a version of ~~an individual~~ the linked value and the  
5 replica linked value, and each ~~comprise at least respective update timestamps that~~  
6 ~~correspond a respective update timestamp that corresponds~~ to when the ~~individual~~  
7 linked value and the replica linked value is updated, and wherein at least one of  
8 the first computer and the second computer is further configured to:

9           compare the conflict-resolution data associated with the linked value of the  
10 multi-valued attribute in the object and the further conflict-resolution data  
11 associated with the linked value of the multi-valued attribute in the replica object;  
12 and

13           resolve the replication conflict in favor of whichever of the linked value or  
14 the replica linked value that first has a higher version number, and second has a  
15 later update timestamp.  
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11. (currently amended) A network system as recited in claim 1, wherein the conflict-resolution data and the further conflict-resolution data each comprise ~~at least respective version numbers that correspond~~ a respective version number that corresponds to a version of ~~an individual~~ the linked value and the replica linked value, and each comprise ~~at least respective update timestamps that correspond~~ a respective update timestamp that corresponds to when the ~~individual~~ linked value and the replica linked value is updated, and wherein at least one of the first computer and the second computer is further configured to:

compare the conflict-resolution data associated with the linked value of the multi-valued attribute in the object and the further conflict-resolution data associated with the replica linked value of the multi-valued attribute in the replica object to resolve the replication conflict;

update the replica linked value of the multi-valued attribute in the replica object if the replica linked value has a lower version number than the linked value of the multi-valued attribute in the object; and

if the version number ~~associated with~~ that corresponds to the replica linked value of the multi-valued attribute in the replica object is equivalent to the version number ~~associated with~~ that corresponds to the linked value of the multi-valued attribute in the object, update the replica linked value of the multi-valued attribute in the replica object if the replica linked value has an earlier update timestamp than the linked value of the multi-valued attribute in the object.

1           **12. (currently amended)**       A network system as recited in claim 1,  
2 wherein the conflict-resolution data comprises a creation indicator that  
3 corresponds to when ~~an individual~~ the linked value is created, a version indicator  
4 that corresponds to a version of the ~~individual~~ linked value, and an update  
5 indicator that corresponds to when the ~~individual~~ linked value is updated.

6  
7           **13. (currently amended)**       A network system as recited in claim 1,  
8 wherein the conflict-resolution data and the further conflict-resolution data each  
9 ~~comprise at least respective creation timestamps that correspond~~ a respective  
10 creation timestamp that corresponds to when an ~~individual~~ the linked value and the  
11 replica linked value is created, ~~each~~ comprise at least respective version numbers  
12 that correspond a respective version number that corresponds to a version of the  
13 ~~individual~~ linked value and the replica linked value, and ~~each~~ comprise at least  
14 ~~respective update timestamps that correspond~~ a respective update timestamp that  
15 corresponds to when the ~~individual~~ linked value and the replica linked value is  
16 updated, and wherein at least one of the first computer and the second computer is  
17 further configured to:

18           compare the conflict-resolution data associated with the linked value of the  
19 multi-valued attribute in the object and the further conflict-resolution data  
20 associated with the replica linked value of the multi-valued attribute in the replica  
21 object; and

22           resolve the replication conflict in favor of whichever of the linked value or  
23 the replica linked value that first has a later creation timestamp, second has a  
24 higher version number, and third has a later update timestamp.

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1           **14. (currently amended)**       A network system as recited in claim 1,  
2 wherein the conflict-resolution data and the further conflict-resolution data each  
3 ~~comprise at least respective creation timestamps that correspond a respective~~  
4 ~~creation timestamp that corresponds~~ to when an individual the linked value and the  
5 replica linked value is created, each ~~comprise at least respective version numbers~~  
6 ~~that correspond a respective version number that corresponds~~ to a version of the  
7 ~~individual linked value and the replica linked value~~, and each ~~comprise at least~~  
8 ~~respective update timestamps that correspond a respective update timestamp that~~  
9 ~~corresponds~~ to when the individual linked value and the replica linked value is  
10 updated, and wherein at least one of the first computer and the second computer is  
11 further configured to:

12           compare the conflict-resolution data associated with the linked value of the  
13 multi-valued attribute in the object and the further conflict-resolution data  
14 associated with the replica linked value of the multi-valued attribute in the replica  
15 object to resolve the replication conflict;

16           update the replica linked value of the multi-valued attribute in the replica  
17 object if the replica linked value has an earlier creation timestamp than the linked  
18 value of the multi-valued attribute in the object;

19           if the creation timestamp ~~associated with~~ that corresponds to the replica  
20 linked value of the multi-valued attribute in the replica object is equivalent to the  
21 creation timestamp ~~associated with~~ that corresponds to the linked value of the  
22 multi-valued attribute in the object, update the replica linked value of the  
23 multi-valued attribute in the replica object if the replica linked value has a lower  
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1 version number than the linked value of the multi-valued attribute in the object;  
2 and

3 if the version number ~~associated with that~~ corresponds to the replica linked  
4 value of the multi-valued attribute in the replica object is equivalent to the version  
5 number ~~associated with that~~ corresponds to the linked value of the multi-valued  
6 attribute in the object, update the replica linked value of the multi-valued attribute  
7 in the replica object if the replica linked value has an earlier update timestamp  
8 than the linked value of the multi-valued attribute in the object.

9  
10 **15. (currently amended)** A network system as recited in claim 1,  
11 wherein the ~~individual linked values have~~ linked value and the replica linked value  
12 each have an associated deletion indicator that is a null identifier to indicate the  
13 existence of ~~[[a]] the~~ linked value of the multi-valued attribute in the object and to  
14 indicate the existence of the replica linked value of the multi-valued attribute in  
15 the replica object.

16  
17 **16. (currently amended)** A network system as recited in claim 1,  
18 wherein the ~~individual linked values have~~ linked value and the replica linked value  
19 each have an associated deletion indicator that corresponds to ~~when an individual~~  
20 the linked value is marked for deletion from the multi-valued attribute in the  
21 object, and when the replica linked value is marked for deletion from the  
22 multi-valued attribute in the replica object.

1           17. (currently amended)       A network system as recited in claim 1,  
2       wherein the ~~individual linked values have~~ linked value and the replica linked value  
3       each have an associated deletion timestamp that corresponds to when ~~an individual~~  
4       the linked value is marked for deletion from the multi-valued attribute in the  
5       object, and when the replica linked value is marked for deletion from the  
6       multi-valued attribute in the replica object, and wherein the second computer is  
7       further configured to delete a replica linked value from the multi-valued attribute  
8       in the replica object if the replica linked value has a deletion timestamp that  
9       indicates the replica linked value is marked for deletion.

1           18. (previously presented) A static-based replication system,  
2 comprising:

3           an object comprising a plurality of multi-valued attributes that each have  
4 associated values, at least one having a multi-valued attribute that includes of the  
5 object having a link table value which is a reference link to a link table which  
6 includes multiple referenced linked values, at least one of the referenced linked  
7 values having associated therewith indicators to indicate a change to the  
8 referenced linked value of the multi-valued attribute;

9           at least a ~~further~~ an additional object ~~replicating~~ replicated from the object,  
10 the ~~further~~ additional object having comprising the plurality of multi-valued  
11 attributes that each have the associated values, and comprising a replica of the link  
12 table which includes a replica of a referenced linked value a multi-valued attribute  
13 that includes a replica value which is a reference link to multiple referenced linked  
14 values, at least one of the referenced linked values having associated therewith the  
15 indicators to indicate a change to the referenced replica linked value of the  
16 multi-valued attribute; and

17           a computing device configured to replicate the object and to identify a  
18 change to [[a]] the referenced linked value of the multi-valued attribute in the  
19 object or a change to the replica linked value of the multi-valued attribute in the  
20 additional object by a change to one or more of the indicators corresponding to the  
21 referenced linked values of the object or the ~~further~~ additional object.

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23           19. (canceled)  
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1           **20. (currently amended)**     A state-based replication system as  
2 recited in claim 18, wherein the indicators comprise a version indicator that  
3 corresponds to a version of [[a]] the referenced linked value.

4  
5           **21. (currently amended)**     A state-based replication system as  
6 recited in claim 18, wherein the indicators comprise an update indicator that  
7 corresponds to when [[a]] the referenced linked value is changed.

8  
9           **22. (currently amended)**     A state-based replication system as  
10 recited in claim 18, wherein the indicators comprise a creation indicator that  
11 corresponds to when [[a]] the referenced linked value is created.

12  
13           **23. (currently amended)**     A state-based replication system as  
14 recited in claim 18, wherein the indicators comprise a version number that  
15 corresponds to a version of [[a]] the referenced linked value and an update  
16 timestamp that corresponds to when the referenced linked value is changed.

17  
18           **24. (currently amended)**     A state-based replication system as  
19 recited in claim 18, wherein the indicators comprise a creation timestamp that  
20 corresponds to when [[a]] the referenced linked value is created, a version number  
21 that corresponds to a version of the referenced linked value, and an update  
22 timestamp that corresponds to when the referenced linked value is changed.  
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1           25. (currently amended)     A state-based replication system as  
2 recited in claim 18, wherein the indicators comprise a deletion indicator that has a  
3 null identifier to indicate the existence of ~~[[a]]~~ the referenced linked value of the  
4 multi-valued attribute.

5  
6           26. (currently amended)     A state-based replication system as  
7 recited in claim 18, wherein the indicators comprise a deletion timestamp that  
8 corresponds to when ~~[[a]]~~ the referenced linked value is marked for deletion from  
9 the multi-valued attribute.

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11          27. (canceled)

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13          28. (currently amended)     A state-based replication system as  
14 recited in claim 27, ~~wherein the first and second computers are~~ 18, wherein the  
15 computing device is further configured to:

16           compare the ~~conflict-resolution-information~~ indicators associated with the  
17 referenced linked value of the multi-valued attribute in the object first data  
18 structure with the ~~conflict-resolution-information~~ indicators associated with the  
19 replica linked value of the multi-valued attribute in the additional object second  
20 data structure;

21           identify a replication conflict; and

22           resolve the replication conflict with the ~~conflict-resolution-information~~  
23 indicators associated with the referenced link value and the replica linked value  
24 values.

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2       **29-54. (canceled)**

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4       **55. (currently amended)**       A method, comprising:

5       replicating an object stored in a first directory with a replica object stored in  
6       a second directory, the object and the replica object comprising a plurality of  
7       multi-valued attributes that each have associated values, at least one having a  
8       multi-valued attribute ~~that includes~~ having a link table value that is a reference to a  
9       link table which includes ~~to~~ multiple linked values, the multiple linked values  
10      having respective conflict-resolution data associated therewith;

11      comparing an individual linked value of the multi-valued attribute in the  
12      object with ~~an individual~~ a replica linked value of the multi-valued attribute in the  
13      replica object to identify a replication conflict; and

14      resolving the replication conflict with the conflict-resolution data associated  
15      with the individual linked value and the replica linked value values.

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17      **56. (currently amended)**       A method as recited in claim 55, wherein  
18      the conflict-resolution data comprises a version number that corresponds to a  
19      version of ~~an~~ the individual linked value, and wherein said comparing comprises  
20      determining if ~~an~~ the individual linked value version number has been changed.

1           **57. (currently amended)**       A method as recited in claim 55, wherein  
2 the conflict-resolution data comprises a version number that corresponds to  
3 respective versions ~~a version~~ of ~~an~~ the individual linked value and the replica  
4 linked value, said comparing comprises determining if ~~an~~ the individual linked  
5 value version number or the replica linked value version number has been  
6 changed, and the method further comprises updating whichever of the individual  
7 linked value or the replica linked value of the multi-valued attribute that has a  
8 lower version number with the individual linked value or the replica linked value  
9 of the multi-valued attribute that has a higher version number.

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11           **58. (currently amended)**       A method as recited in claim 55, wherein  
12 the conflict-resolution data comprises an update timestamp that corresponds to  
13 when ~~an~~ the individual linked value is changed, and wherein said comparing  
14 comprises determining if ~~an~~ the individual linked value update timestamp has been  
15 changed.  
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1           **59. (currently amended)**       A method as recited in claim 55, wherein  
2 the conflict-resolution data comprises an update timestamp that corresponds to  
3 respective versions of when ~~an~~ the individual linked value or the replica linked  
4 value is changed, said comparing comprises determining if ~~an~~ the individual  
5 linked value update timestamp or the replica linked value update timestamp has  
6 been changed, and the method further comprises updating whichever of the  
7 individual linked value or the replica linked value of the multi-valued attribute that  
8 has an earlier update timestamp with the individual linked value or the replica  
9 linked value of the multi-valued attribute that has a later update timestamp.

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11           **60. (currently amended)**       A method as recited in claim 55, wherein  
12 the conflict-resolution data comprises a creation timestamp that corresponds to  
13 when ~~an~~ the individual linked value is created, and wherein said comparing  
14 comprises determining if a creation timestamp has been changed.

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16           **61. (currently amended)**       A method as recited in claim 55, wherein  
17 the conflict-resolution data comprises a creation timestamp that corresponds to  
18 respective versions when ~~an~~ the individual linked value or the replica linked value  
19 is created, said comparing comprises determining if a creation timestamp has been  
20 changed, and the method further comprises updating whichever of the individual  
21 linked value or the replica linked value of the multi-valued attribute that has an  
22 earlier creation timestamp with the individual linked value or the replica linked  
23 value of the multi-valued attribute that has a later creation timestamp.

1           **62. (currently amended)**       A method as recited in claim 55, wherein  
2 the conflict-resolution data comprises a version number that corresponds to a  
3 version of ~~an~~ the individual linked value and an update timestamp that corresponds  
4 to when the individual linked value is changed, and wherein said comparing  
5 comprises determining if ~~an~~ the individual linked value version number has been  
6 changed and if the individual linked value update timestamp has been changed.

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8           **63. (currently amended)**       A method as recited in claim 55, wherein  
9 the conflict-resolution data comprises a version number that corresponds to a  
10 version of ~~an~~ the individual linked value and an update timestamp that corresponds  
11 to when the individual linked value is changed, and the method further comprises  
12 updating the individual linked value of the multi-valued attribute that first has a  
13 lower version number, and second has an earlier update timestamp.

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15           **64. (canceled)**  
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1           **65. (currently amended)**       A method as recited in claim 55, wherein  
2 the conflict-resolution data comprises a creation timestamp that corresponds to  
3 when ~~an~~ the individual linked value is created, a version number that corresponds  
4 to a version of the individual linked value, and an update timestamp that  
5 corresponds to when the individual linked value is changed, and wherein said  
6 comparing comprises determining if ~~an~~ the individual linked value creation  
7 timestamp has been changed, if the individual linked value version number has  
8 been changed, and if the individual linked value update timestamp has been  
9 changed.

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11           **66. (currently amended)**       A method as recited in claim 55, wherein  
12 the conflict-resolution data comprises a creation timestamp that corresponds to  
13 when ~~an~~ the individual linked value is created, a version number that corresponds  
14 to a version of the individual linked value, and an update timestamp that  
15 corresponds to when the individual linked value is changed, and the method  
16 further comprises updating the individual linked value of the multi-valued attribute  
17 that first has an earlier creation timestamp, second has a lower version number,  
18 and third has an earlier update timestamp.

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20           **67. (canceled)**  
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1           **68. (currently amended)**       A method as recited in claim 55, wherein  
2 the individual linked values have a deletion timestamp that is a null identifier to  
3 indicate the existence of a linked value of the multi-valued attribute.

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5           **69. (currently amended)**       A method as recited in claim 55, wherein  
6 the individual linked values have a deletion timestamp that corresponds to when  
7 an individual linked value is marked for deletion from the multi-valued attribute.

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9           **70. (currently amended)**       A method as recited in claim 55, wherein  
10 the individual linked values have a deletion timestamp that corresponds to when  
11 an individual linked value is marked for deletion from the multi-valued attribute,  
12 and the method further comprises deleting a linked value from the multi-valued  
13 attribute if the linked value has a deletion timestamp that indicates the linked value  
14 is marked for deletion.

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16           **71-86. (canceled)**  
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